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ABSTRACT

The encoding specificity principle predicts that a change in context between input and test will adversely affect recognition memory. Experiment I tested this with sentences from a prose passage and no context effects were obtained. Experiments II, III, and IV compared context effects for words in random sentences versus connected discourse. In most cases, the usual encoding specificity effects were obtained for a list of unrelated sentences. But context effects were attenuated or wiped out when the test items had been embedded in a meaningful passage. The theme of a passage serves as a powerful retrieval cue that overrides the context effects that have typically been obtained. (Author)

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Encoding Specificity for Sentences in Connected Discourse[1]

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The research I will be reporting on this morning represents a brief summary of Bob Christiaansen's Master's thesis. Bob was interested in Tulving and Thomson's (1973) principle of encoding specificity and decided to find out how well it applied to my own area of interest, constructive memory for prose (e.g., Dooling & Lachman, 1971; Sulin & Dooling, 1974).

Briefly, the encoding specificity principle states that the encoding processes performed on an item determine what will be effective retrieval cues for remembering it. For example, if you see the word bat in a list of animals and encode it as a small, black, flying mammal, the following retrieval cue will be of no help: Baseball equipment: _____. Our experiments deal with recognition memory. The encoding specificity principle predicts that a change in context between study and test will adversely affect recognition memory. For example, if strawberry JAM appeared on the input list and traffic JAM on the recognition test, subjects would have a hard time recognizing the word JAM.

Experiment I

In the first experiment, we had subjects read a long, biographical passage. One of the passages is partially reprinted in Table 1. The passage is about a diplomat named William Cawley. Buried among numerous descriptions of his many travels is the following sentence: He flew across the Atlantic to Paris. This sentence, taken out of context, represents the first thing subjects think of when asked about Charles Lindbergh. Charles Lindbergh therefore represents a misleading, changed context for the recognition test. Immediately after reading the passage, subjects were given a recognition test for the one key sentence. The three conditions of testing are shown in Table 2. Most encoding specificity experiments compare the effects of same vs different context. Here, we provide a slightly more difficult test for the theory, comparing the different, misleading context to no context at all. We had two versions of no-context: In the first, subjects are given nothing to do on the first page of their booklets; in the second, they make an irrelevant judgment. In the third condition, subjects are forced to comprehend the sentence with respect to Charles Lindbergh. Then all subjects are given the same recognition test for the key sentence.

In addition to the three types of test context, we also manipulated the presence or absence of the key sentence during the input phase. That is, half of the subjects read the passage with the key sentence omitted. They were given the same test as the others.

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The results are summarized in Table 3. Each cell represents the percentage of Yes responses by 54 subjects, collapsing across the two different passages that we used. There are no significant context effects. The misleading context did not adversely affect recognition memory. Performance of the subjects who never read the target sentence makes it clear that the lack of context effects is not due to some kind of floor effect. It is of some interest to note that Bower and Karlin (1974) also found no context effects in the recognition of faces.

Now we had expected the encoding specificity effect to work with connected discourse and had purposely introduced a number of procedural variations into our study in order to extend the scope of the principle. So when we got no context effects, we were left with a list of possibilities to explore. (For example, our study had no same context condition; we gave only one item on the recognition test; the context and test item appeared on different pages of the test booklet; etc.) But it seemed to us that the most important difference was due to the structure of prose itself. When a subject has just studied a long list of unrelated words the retrieval problem is tremendous. But in the present study, we can be very sure that the subjects had a good memory for the general idea or theme of the passage which they read. For example, they knew that William Cawley did a lot of flying around to various countries. Surely this memory for the theme of the passage guided the subjects' retrieval processes in some way. Perhaps the theme of the passage overrode the manipulated context effects.

Experiment II

To test our interpretation of the Experiment I results, we decided to replicate a classic encoding specificity experiment as closely as possible, manipulating the presence or absence of a thematic structure. Light and Carter-Sobell (1970) tested recognition memory for homographs. Druing the study phase, each homograph was embedded in a sentence that biased its meaning in a particular way, such as in the strawberry-JAM--traffic-JAM example I mentioned earlier. Subjects therefore read a list of unrelated sentences during input and were given same vs different context on the recognition test. We replicated their experiment by giving subjects a list of 40 unrelated sentences, four of which contained homographs (cf. Table 4). Another group of subjects read the exact same homograph sentences, but embedded in two meaningful passages of 20 sentences each.

The results are summarized in Table 5. We show the percent correct "Yes" responses for three context conditions. Looking first at the Random Sentences group, we failed to replicate Light and Carter-Sobell with two of the items, bank and pitcher. The items, jam and cracker, do give us nice encoding specificity effects: performance drops significantly between same vs different context conditions. But when these same two items are embedded in a

meaningful story, the context effect washes away. So for the items that replicate the encoding specificity effects, we got the results we expected: the structure of prose washed away the effect.

We were upset by the lack of generality across words which is a serious and neglected problem in verbal learning and psycholinguistics (cf. Clark, 1973). But we decided to stick to our main concern, while sidestepping the pesky problem of generality.

Experiment III

Experiment III was a simple replication of Light and Carter-Sobell (1970) for the purpose of selecting items that worked. We decided that our point about connected discourse could be made most effectively if we were dealing with verbal materials that gave good encoding specificity effects under the usual conditions. We chose 20 homographs from Light and Carter-Sobell (1970) and added two of our own from Experiment II. All subjects were run under the usual, unrelated sentences condition. The results summarized in Table 6 show enormous variability across materials. The items at the top show a huge encoding specificity effect, but BANK (an item we had used in Experiment II) shows no effect whatever. From this list we chose two homographs that gave very strong effects: TRAP and LINE.

Experiment IV

In Experiment IV, we embedded these two homographs and their biasing sentences (both meanings for each) in prose passages and repeated Experiment III as closely as possible. The results are shown in Table 7. In three of the four cases, the context effects are not significant. The item crooked LINE is an exception to the effect we were predicting. We ran out of subjects in the late Spring and could not follow up the results further. We are anxious to repeat these experiments with a wider variety of verbal materials in the fall quarter. We do feel that the preponderance of evidence collected so far supports our initial interpretation of the encoding specificity effect in connected discourse. When subjects read prose they remember its thematic structure and use it as a retrieval cue on the recognition test. When this is done, other context effects are either wiped out or greatly attenuated.

Conclusions

Assuming that our interpretation is correct, what are the implications for the principle of encoding specificity?

1. I do not think that our results disconfirm the "principle" in any way. The nominal stimulus is differentially encoded in different contexts and there does appear to be some special relationship between these encodings and retrieval processes. It is, in fact, almost impossible to disprove the "principle" at this level.

2. I do think that our results show a flexibility in the retrieval process that would not have been predicted from Tulving and Thomson's research. Others have made this same point (e.g., Santa & Lamwers, 1974; Pellegrino & Salzberg, 1975). Subjects are not rigidly bound by the relationship between their initial encodings and cues in the retrieval environment.

3. Our studies do seem to show that subjects make use of the thematic structure of connected discourse as a retrieval cue. The mechanisms of this retrieval process probably cannot be studied by doing research on lists of unrelated words. The major challenge for the encoding specificity principle (or any theoretical conception of memory) would seem to be to show how meaningful text is encoded and retrieved from memory. The "principle" could be entirely true and still tell us very little about how information is stored in and retrieved from human memory.

References

Bower, G. H., & Karlin, M. B. Depth of processing pictures of faces and recognition memory. Journal of Experimental Psychology, 1974, 103, 751-757.

Clark, H. H. The language-as-fixed-effect fallacy: A critique of language statistics in psychological research. Journal of Verbal Learning and Verbal Behavior, 1973, 12, 335-359.

Dooling, D. J., & Lachman, R. Effects of comprehension on retention of prose. Journal of Experimental Psychology, 1971, 88, 216-222.

Light, L. L., & Carter-Sobell, L. Effects of changed semantic context on recognition memory. Journal of Verbal Learning and Verbal Behavior, 1970, 9, 1-11.

Pellegrino, J. W., & Salzberg, P. M. Encoding specificity in cued recall and context recognition. Journal of Experimental Psychology: Human Learning and Memory, 1975, 1, 261-270.

Santa, J. L., & Lamwers, L. L. Encoding specificity: Fact or artifact. Journal of Verbal Learning and Verbal Behavior, 1974, 13, 412-423.

Sulin, R. A., & Dooling, D. J. Intrusion of a thematic idea in retention of prose. Journal of Experimental Psychology, 1974, 103, 255-262.

Tulving, E., & Thompson, D. M. Encoding specificity and retrieval processes in episodic memory. Psychological Review, 1973, 80, 352-373.

Footnote

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Handout

Table 1

Example of Materials Used in Experiment I

William Cawley

William Cawley is known for his careers as both a businessman and a diplomat. He was born in Florence, South Carolina on September 7, 1896. His early education was in private schools in Havana, Cuba where his father was then working. He later received two years of college education at the University of Florida.

As a young lad William held various jobs. His first important business training came during 1914 when he worked for an export house. He traveled extensively in Columbia and Venezuela while at this job.... etc.

In 1915 Mr. Cawley served as a special assistant to the Defense Department. He dealt with various problems regarding the North Atlantic Treaty Organization. At this time the U.S. was interested in obtaining military bases in France. He flew across the Atlantic to Paris. There Mr. Cawley personally handled the negotiations. While at this post, he also traveled to Spain and Great Britain. In 1952 he was assigned a position in the State Department. He soon became a close advisor to the president on foreign affairs. His first hand knowledge of many countries made him a valuable counselor.

He resigned his post in 1955, and returned to his home in Miami.... etc.

Note--This passage was 841 words long. The other passage had 921 words. The key sentence was not underlined in the passages read by Ss.

Table 2

Example of Test Conditions in Experiment I

	Context		
	None	Irrelevant	Misleading
Note:	We have no further instructions for you at this point. Please wait for the students to read their version of this page.	Is the following sentence true of George Washington?	Is the following sentence true of Charles Lindbergh?
Page 1		"He was the first president."	"He flew across the Atlantic to Paris."
		TRUE____ FALSE____	TRUE____ FALSE____
Page 2	Did the following sentence occur in the passage that you read about William Cauley?	Did the following sentence occur in the passage that you read about William Cauley?	Did the following sentence occur in the passage that you read about William Cauley?
	"He flew across the Atlantic to Paris."	"He flew across the Atlantic to Paris."	"He flew across the Atlantic to Paris."
	YES____ NO____	YES____ NO____	YES____ NO____

Table 3

Percent "Yes" Responses For

Experiment I Collapsed Across Passage

Target Sentence	None	Irrelevant	Misleading
Present	63	67	67
Omitted	02	07	11

Table 4

Example of Materials Used in Experiment II

Random Sentences

The house was supposedly haunted by an elusive ghost.

The children were studying the ant colony.

Each day hundreds of people came to tour the royal palace.

Jimmy had been spending much of his time reading that paperback book.

The emergency hospital was well equipped.

They believed that the peasant revolt would eventually be successful.

Al was talked into a binding contract.

It was a nearby savings bank.

All the harvested wheat was shipped by rail.

ETC. ETC. ETC.

Connected Discourse

The Conner gang met to plan a major robbery.

The group was composed of hardened criminals.

Each man had spent time in a state or federal prison.

Jimmy, the leader, had selected each one personally for this difficult job.

Their special talents were all needed.

They met in a secluded cabin to discuss the plans.

Jimmy unrolled a set of detailed blueprints.

It was a nearby savings bank.

All the alarm devices and cameras were marked.

ETC. ETC. ETC.

Note--Target words were not underlined in the sentences read by subjects.

Table 5

Percent Correct "Yes" Responses in Experiment II

Condition	Context		
Random Sentences	Same	None	Different
Bank	56	68	81
Pitcher	75	88	75
Jam	88	69	62
Cracker	88	44	44
Connected Discourse			
Bank	81	94	62
Pitcher	94	88	81
Jam	88	88	100
Cracker	100	62	88

Table 6

Percent Correct "Yes" Responses in Experiment III

	Context Adjectives	Target Noun	Context Same	Context Different	Size of Effect
1.	High/Trade	Mark	76	32	44
2.	Dinner/Bank	Roll	76	41	35
3.	Sand/Speed	Trap	82	50	32
4.	Production/Crooked	Line	79	50	29
5.	Playing/Green	Fields	71	41	30
6.	Chip/Skinny	Dip	88	62	26
7.	Paisley/Close	Ties	88	65	23
8.	Marriage/New	Contract	76	53	23
9.	Light/Tulip	Bulb	59	38	21
10.	Fixed/Wild	Game	76	56	20
11.	Magic/Red	Tape	88	68	20
12.	Grandfather/Time	Clock	74	53	21
13.	Daily/Term	Paper	79	65	14
14.	Public/Wall	Hanging	76	62	14
15.	Brief/Divorce	Case	74	62	12
16.	Soda/Safe	Cracker	65	56	09
17.	Lead/Favorite	Pipe	68	59	09
18.	Double/River	Bed	65	56	09
19.	Mortar/Sea	Shell	68	59	09
20.	Level/Fighter	Plane	65	59	06
21.	Open/Pole	Vault	79	74	05
22.	River/Savings	Bank	65	65	00

Table 7

Percent Correct "Yes" Responses in Experiment IV

Homograph	Input Context	Test Context: Same	Test Context: Different	Size of Effect
Trap	Sand	82	85	+03
	Speed	82	71	-11
Line	Production	74	71	-03
	Crooked	94	41	-53